# Sustainable Finance
# Essays on Methods and Impact

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**Four studies examine how data quality, investor behavior, bank lending, and measurement standards shape sustainable finance.**

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01 / COMPANY DATA

## Fill sustainability data gaps

With Christian Haas and Ulf Moslener

**MAIN RESULT**

**Best models explain 69% to 92% of sample variation across five indicators. Prediction performance varies by metric and use case.**

**OUT-OF-SAMPLE PERFORMANCE | $R^2$**




Five targets; higher $R^2$ indicates more sample variation explained.

**DATA & METHOD**

Listed-company data, 95 countries, 2005-2022; sample sizes range from 18,426 to 108,834 by metric. Models use 211-255 financial/fundamental predictors. Linear and ridge baselines are compared with CatBoost, XGBoost, and stacked models; conformal intervals quantify uncertainty.

**ADDITIONAL ANALYSIS**

Scope 1 predictions fall in the correct one of five ranked groups in 88.8% of cases. Performance is weaker for smaller firms and varies by indicator, sector, and time.

02 / INVESTOR IMPACT

## Investor ownership and company outcomes

With Maurice Dumrose and Youri Matheis

**MAIN RESULT**

**Higher responsible ownership is associated with improving ESG ratings, but no evidence shows faster Scope 1 decarbonization.**

**SCOPE 1 EMISSIONS CHANGE, BETA**




95% CI; all include zero

**ESG RATING CHANGE, BETA**




95% CI; positive at each horizon

**DATA & METHOD**

Global listed-company panel, 2009-2023: 25,050 firms and 275,532 firm-year observations. Responsible investors are mainly UN PRI members. OLS models relate ownership to one- to five-year changes in emissions and ratings, controlling for institutional ownership and firm characteristics; CA100+ is used for robustness.

**ADDITIONAL ANALYSIS**

Across one- to five-year horizons, Scope 1 estimates are positive and their 95% confidence intervals include zero. ESG-rating estimates are positive and statistically significant at every horizon. These are associations, not causal effects.

03 / SME LENDING

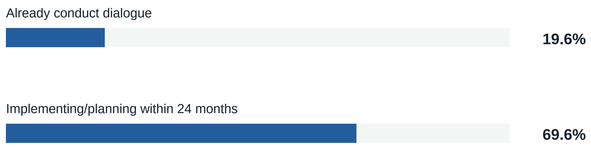
## Risk dominates transformation in SME lending

Single-authored paper

**MAIN RESULT**

**Banks integrate sustainability mainly through risk assessment. Support for business-model transformation remains less developed.**

**SUSTAINABILITY-RELATED CLIENT DIALOGUE**




**62** banks in final sample

**34.4%** of German banking assets represented

**SURVEY DESIGN**

Survey of Germany's 314 largest banks by balance sheet. The final sample includes 62 banks, a 19.8% bank response rate, and 34.4% of 2021 German banking assets. Questions cover risks, lending practices, sustainability data, and relationship banking.

**ADDITIONAL ANALYSIS**

19.6% of banks already conduct sustainability dialogue; 69.6% are implementing it or plan to within 24 months. Banks prefer hard data, while relationship dialogue can add soft information. Risk management advances faster than support for business-model transition.

04 / MEASUREMENT

## Taxonomy alignment and ESG ratings

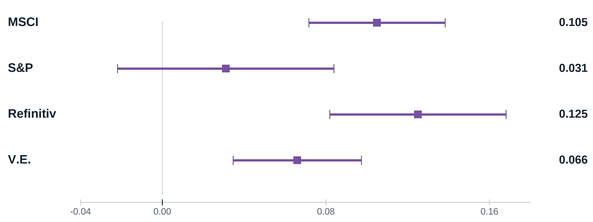
With Maurice Dumrose and Julia Eckert

**MAIN RESULT**

**Taxonomy alignment is positively related to three of four environmental ratings. The EU framework has not removed rating divergence.**

**MODEL I: RELATIVE TAXONOMY ALIGNMENT**

Coefficient on environmental rating (95% CI)




Positive and significant for MSCI, Refinitiv, and V.E.; S&P is not significant.

**DATA & METHOD**

ISS ESG firm-level revenue alignment and environmental ratings from four providers; up to 1,813 firms, including 440 with full Taxonomy exposure. Tobit regressions control for firm size, domicile, and industry. Model I estimates the alignment relationship; Model II tests full-exposure interactions.

**ADDITIONAL ANALYSIS**

Model I coefficients are 0.105 for MSCI, 0.031 for S&P;, 0.125 for Refinitiv, and 0.066 for V.E. The three significant positive relationships are conditional associations. Model II finds stronger relations for firms with full Taxonomy exposure.

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**WHY THESE FOUR PAPERS MATTER**

Sustainable finance serves two connected aims: supporting sustainability in the real economy and strengthening the financial system against environmental and social risks. It works through information, regulation, capital allocation, risk assessment, lending, and engagement. Across these studies, measurement tools show promise, while evidence that financial decisions translate into company-level transition remains uneven.

**Terms:** Scope 1 means direct greenhouse-gas emissions from a company's operations. ESG means environmental, social, and governance. The EU Taxonomy classifies economic activities against environmental criteria. SMEs are small and medium-sized enterprises.

Source: Sebastian Rink, *Sustainable Finance: Essays on Methods and Impact*, Justus Liebig University Giessen, submitted November 2024, defended April 2025, chapters 1-4. Regression intervals are estimate +/- 1.96 standard errors. Associations do not establish causality.